

Article

Compassion Fatigue in Chimpanzee (*Pan troglodytes*) Caregivers: Prevalence, Contributing Factors, and Coping Mechanisms

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Abstract: Compassion fatigue (CF) refers to the exhaustion and distress caused by the demands of caring for others. CF occurs in a variety of helping professions, including physicians, nurses, educators, social workers and animal caregivers, and is known to adversely impact both caregivers' quality of life and the care they provide. This study assessed the prevalence, risk and protective factors, coping strategies and support programs for CF in chimpanzee caregivers ($N = 123$) at accredited sanctuaries and zoos in the United States. Online survey results revealed that 91.06% of chimpanzee caregivers experienced CF at some point in their careers. Common CF symptoms were exhaustion, frustration, anxiety, depression, and apathy. Perceived factors influencing CF included being understaffed, lacking resources and training, poor relationships with coworkers and supervisors, and financial insecurity. Commonly reported coping strategies were talking to someone, having pets, self-care, and getting away from work. 20.33% of caregivers reported having institutional support programs available to them, however they were rarely viewed as helpful and 32.52% of respondents were unsure about program availability. Overall, our findings suggest that, like other caregiving professionals, chimpanzee caregivers are susceptible to CF and may benefit from new or updated support programs that continue to build a 'culture of care' that meets employee, animal, and facility needs.

Keywords: compassion fatigue; chimpanzee; zoo; sanctuary; zookeeper; caregiver



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1. Introduction

Workplace stressors can negatively impact the physical and mental health of employees [1,2]. This can be exacerbated in caring professions due to the strong bonds that can form between caregivers and the individuals they care for, putting caregivers at risk of developing compassion fatigue (CF) [3]. CF, a state of mental and physical exhaustion and distress that results from prolonged exposure to the stress associated with helping or wanting to help others [3], is well documented in human-care professions (for reviews, see [4,5]). However, researchers have also recognized its prevalence among animal caregivers [6,7]. To date, CF has been identified in individuals working in animal laboratories (hereafter lab) [8–15], sanctuaries [16,17], shelters [18–21], rehabilitation centers [22,23], veterinary hospitals [20,24,25], and zoos [17,23,26,27], though few effective treatments have been identified for animal-care professionals [28]. Further assessing CF across a wide array of animal caregiving professions is thus a vital step in developing strategies to improve the professional lives of animal caregivers.

Symptoms of CF include sleep disturbance, withdrawal, depression, anxiety, cynicism, denial, hypervigilance, self-medication, dissociation, numbness, and feelings of guilt and anger related to work [7]. These symptoms are associated with burnout and secondary traumatic stress, the two components of CF, and can reduce empathy and compassion in those working in helping-professions. Similar to human-care professionals, CF has been shown to compromise animal caregivers' quality of life and induce emotions such

as exhaustion, anger, sadness, apathy, and isolation [7]. CF can also impact institutions through absenteeism, high employee turnover, staff conflict, human error, and diminished productivity [8,29,30]. Moreover, CF may reduce empathy and the quality of care workers provide, negatively impacting the wellbeing of those in their care [3,14,31,32].

The stressors that contribute to CF across animal-care professions vary. Risk factors include exposure to neglect cases, euthanasia-related stress, caring for animals with chronic diseases or atypical histories, and end-of-life care [7,29,32,33]. More general occupational and institutional stressors, such as financial insecurity, inadequate training and resources, understaffing, and poor relationships with other staff members also play a role [3,5,34,35]. Research further suggests that susceptibility to, and ability to cope with, these stressors varies according to individual factors, such as personality. For example, higher scores of emotional stability, openness, and extraversion were found to mitigate self-reported CF in lab animal personnel [11], while coping mechanisms differed according to personality traits [13].

While the focus of CF research has begun to extend to animal-professions, to our knowledge no study has both studied and systematically compared CF across the sanctuary and zoo caregiving communities, despite the presence of work-related stressors associated with CF in the broader field of animal-care [36]. We view these as important institutions to study as the regular human-animal interactions required for routine husbandry procedures (e.g., positive reinforcement training), alongside the strong, long-term bonds caregivers form with the animals in their care [37], may put sanctuary and zoo caregivers at risk of developing CF [3,26,35]. Human-animal relationships are generally considered beneficial [38] and may lead to compassion satisfaction (CS)—a sense of fulfilment that arises from caring for others [8,39,40]. However, they can also lead to stress in and out of the workplace [35,41]. For example, similar to reports from lab animal employees [42] and veterinary workers [24], caregivers at one zoo reported that working directly with the animals was their favorite part of their job while simultaneously describing intense feelings of CF [26]. Some assessments ([43] but see [8,11]) further suggest that working with non-human primates, in particular, is associated with higher levels of CF compared with non-primates while compassion for different species rises with phylogenetic similarity to humans [44]. Illustrating this, a recent survey of the professional quality of life of chimpanzee (*Pan troglodytes*) caregivers found moderate to high levels of CS, but this was coupled with higher levels of burnout and secondary traumatic stress than other types of animal and human care workers [17]. Although the causes of this elevated stress and burnout in chimpanzee caregivers are unknown, chimpanzees, as highly intelligent and socially complex animals [45] that form long-term bonds with conspecifics [46,47] and human caregivers [48,49] may plausibly contribute to CF susceptibility.

The objectives of this study were three-fold. Given the one study [17] that assessed CF in chimpanzee caregivers reported elevated levels of CF, our first goal was to extend this work to provide a comprehensive assessment of CF by investigating associated risk factors, coping mechanisms, and support programs in this population, in addition to CF prevalence. Second, we explored CF in chimpanzee caregivers across two settings, sanctuaries accredited by the Global Federation of Animal Sanctuaries (GFAS) and zoos accredited by the Association of Zoos and Aquariums (AZA) in the United States, allowing direct comparisons across institution type. In light of reported individual variation in CF [11,13,50], our third aim was to assess any role of personality in CF prevalence and the strategies individuals employ to mitigate CF. We focused exclusively on caregivers since they are directly involved in all aspects of caring for chimpanzees and to control for potential variation in CF across specific worker roles [9]. We utilized a CF survey developed for North American lab animal professionals (animal caregivers, veterinarians, researchers, etc.) [11] which has since also been administered to lab animal professionals in Europe, China, and Japan [13]. We opted for this survey as, unlike other measures that explicitly focus on euthanasia stress [51] or broadly on professional quality of life (e.g., ProQOL-V [52]), it allowed us to examine the perceived causes and consequences of CF. Specifically,

using this survey, we assessed (i) the prevalence of CF and its associated symptoms among chimpanzee caregivers, (ii) personal and work-related factors that influence CF, (iii) coping mechanisms for CF, and (iv) the effectiveness of any pre-existing CF support programs and what new programs might be beneficial. In doing so, we sought to understand how CF manifests itself in chimpanzee caregivers and to determine whether self-reported CF is as prevalent in chimpanzee caregivers working in sanctuaries and zoos as in lab animal professionals [11–13].

We predicted that, similar to other care-animal professions [7,33], self-reported experiences of CF would be common among chimpanzee caregivers [17], though in line with lab animal personnel [11,13], we predicted that emotional stability, openness, and extraversion would be associated with not having experienced CF. Compared to zoos, sanctuaries tend to house older, non-breeding chimpanzee populations [53], increasing the frequency with which caregivers experience end-of-life care and euthanasia, known CF stressors [29,32,51]. Accordingly, we predicted that, if we were to see any institutional differences, CF would be more prevalent among sanctuary employees. However, we predicted there would be no other significant differences between sanctuary and zoo employees as much of the day-to-day care and management of captive chimpanzees does not vary between institution type.

2. Materials and Methods

2.1. Ethics Statement

This study was endorsed by the Chimpanzee Species Survival Plan (SSP) and was reviewed and approved by the Lincoln Park Zoo's Institutional Review Board (approval number: IRB-22-001-EX). Where required, this study was also approved by the research committees at all sanctuaries and zoos with employees who participated in the study.

2.2. Participants

Participants ($N = 123$, $N = 106$ females; see Table 1) in this study were employed in the United States as chimpanzee caregivers by a GFAS-accredited sanctuary ($N = 4$) or an AZA-accredited zoo ($N = 28$) and were aged 18 years old or older. All respondents completed an informed consent form outlining the study before completing the survey. Respondents remained anonymous and participation was voluntary as respondents were free to refuse to answer any questions and stop the survey at any time. Data collection occurred between 28 March and 1 June 2022.

Table 1. Respondent demographics.

Variable	Sanctuary n (%)	Zoo n (%)
Total respondents ($N = 123$)	35 (28.46)	88 (71.54)
Gender		
Female	32 (91.43)	74 (84.09)
Male	3 (8.57)	14 (15.91)
Non-binary	0 (0)	0 (0)
Prefer to self-describe	0 (0)	0 (0)
Age		
18–25	11 (31.43)	12 (13.64)
26–35	19 (54.29)	53 (60.23)
36–45	1 (2.86)	18 (20.45)
46–55	2 (5.71)	3 (3.41)
55–65	2 (5.71)	2 (2.27)
>65	0 (0)	0 (0)

2.3. Procedure

Participants completed an approximately 15-min online questionnaire (www.SurveyMonkey.com; accessed on 7 February 2022) to assess CF. A link to the questionnaire was provided to the Chimpanzee SSP Institutional Representative at each of the

zoos that agreed to participate, or their equivalent at sanctuaries, for dissemination to the chimpanzee care staff. We utilized the questionnaire developed by Randall et al. [11] for use with lab animal professionals. The questionnaire consisted of an informed consent prompt followed by 75 questions or prompts broken down into four parts: (A) Demographics, (B) Compassion fatigue, (C) Nature of work, and (D) Solutions and coping mechanisms. All questions were identical to those included in the original survey [11], except for a few items that we modified, added, or deleted to better adapt the survey to chimpanzee caregivers (these changes are described below and the entire survey can be viewed in the Supplementary Materials).

In part A, we collected basic demographic information (e.g., sex, age), whether participants were employed by a sanctuary or a zoo, years of experience working with chimpanzees, years in their current position, and a new question asking how often (always, often, sometimes, rarely, never) participants felt understaffed at work given the pandemic's effect on staffing at zoos [54]. To ensure confidentiality, participants were not asked for their names, email addresses, or the name of their institutions. Part A of the survey also included a brief, validated personality self-assessment (the Ten-Item Personality Index [55]) to assess the influence of personality traits on self-reported CF and use of different coping mechanisms.

In part B, participants were provided with the following prompt: *"Compassion fatigue is a profound emotional and physical exhaustion that animal caregivers can develop when they are unable to refuel and regenerate because of the nature of their work. Compassion fatigue is a normal occurrence and is commonly seen across many professions, including individuals working with and caring for animals"* (see [11]). This was followed by asking whether they had ever experienced CF (yes, no, unsure). Participants were then asked about which feelings (sadness, depression, anxiety, apathy, hopelessness, resentment, guilt, frustration, anger, exhaustion, isolation, other) they associated with CF as well as a number of questions about the frequency (always, often, sometimes, rarely, never) with which they experienced a variety of feelings at work (e.g., stressed, apathetic, comfortable discussing concerns with supervisors, blame yourself for the suffering of animals, etc.). Next, the survey asked the extent (extremely, moderately, somewhat, slightly, not at all, not applicable) to which a number of work- and personal-related factors (e.g., working overtime, company image, relationships with coworkers, relationships with animals, financial problems, lack of training, see supplemental materials for full list) influenced participants' feelings of CF. Lastly, we added a question asking whether the COVID-19 pandemic had contributed to participants' experiences of CF as Randall et al. [11] surveyed lab animal personnel prior to the pandemic.

In part C of the survey, participants were asked about the nature of their work, while prompted that "Responses to this section should relate exclusively to chimpanzee-related work (e.g., if applicable, do not consider current or previous experiences working as a caregiver for other species)." Participants were asked if they felt they had received adequate training and resources to do their job properly, the procedures they regularly performed, and as we only surveyed chimpanzee caregivers, we revised a question asking which species participants worked with to ask which, if any, species they worked with in addition to chimpanzees. We also revised a question asking which procedures participants regularly perform to better fit the daily responsibilities of chimpanzee caregivers (training, feeding, shifting, cleaning, preparing and providing enrichment, research, routine veterinary procedures, other). Lastly, we added seven new questions which asked about how often (never, once, multiple) participants had experienced various stressful chimpanzee-specific work-related events (transfer in, transfer out, live birth, still birth, natural causes death, euthanasia death, social introductions).

In part D of the survey, participants were asked which solutions and coping mechanisms (talk to someone, self-care, therapist, get away from work, physical activity, mindfulness, own pets, religion, drugs and alcohol, emotional eating, release emotions after work, emotionally detach from work, seek further education, none, other) they used for CF and

how frequently (always, often, sometimes, rarely, never) these strategies were effective. Participants also ranked how beneficial a variety of physical (place and time to exercise at work, activity groups at work, monetary reimbursement for activities outside of work, none) and mental/emotional (quiet place, mindfulness classes, therapist, training on coping mechanisms, self-care training, self-monitoring of CF, none) programs would be to have in their place of work. Participants did the same for social (support group, memorial for animals, recreational activities outside work, building and strengthening relationships with co-workers, lunch time activities, none), and work-management (enforcing strict workday hours, paid leave from work, childcare programs at work, communication workshops, reward programs, ability to change workspace environment, debriefing on experiments and veterinary procedures, none) programs. Finally, participants could provide open ended comments regarding CF support program ideas and the survey itself.

2.4. Data Analysis

Descriptive statistics (frequencies and percentages) are reported throughout (*sensu* [11]). The Ten-Item Personality Index (TIPI) responses were scored or reverse scored as appropriate. Scores were added together according to the TIPI scoring formula [55], with the maximum score for each trait being 7 and the minimum being 1. We ran a series of logistic regressions with all five personality trait scores (extraversion, agreeableness, conscientiousness, emotional, and openness) and institution type (sanctuary or zoo) as independent variables to determine which factors predicted whether or not participants used 15 different CF coping mechanisms included in the survey (see Supplemental Materials, question 69). Unfortunately, due to ceiling effects of respondents having experienced CF, we were unable to complete a number of planned analyses on personality traits and risk and protective factors for CF and therefore report descriptive data. Specific questions with answers that were partially complete or incomplete were excluded from the analyses. Where possible, we compared responses from sanctuary caregivers with those of zoo caregivers using chi square tests or Fisher's exact tests (FETs) if there were five or fewer respondents in any category of response [56]. As there were no significant associations between gender, age, or experience and compassion fatigue (FETs: $p > 0.05$), these data were pooled for the analyses. All statistical analyses were performed in R version 4.1.1 [57].

3. Results

3.1. Compassion Fatigue

The majority of the 123 respondents self-reported experiencing CF at some point in their careers caring for chimpanzees (sanctuary: 88.57%; zoo: 92.05%; see Table 2). Few respondents from both settings reported never having experienced CF (sanctuary: 2.86%; zoo: 3.41%) or were unsure (sanctuary: 8.57%; zoo: 4.55%). There was no significant association between sanctuary and zoo employees' experiencing CF (FET: $p > 0.05$). Most respondents reported that CF impacted their ability to do their jobs "often" or "sometimes" (sanctuary: 71.43%; zoo: 67.05%) and that CF "often" or "sometimes" made them feel apathetic toward their jobs (sanctuary: 71.43%; zoo: 78.41%). However, only three respondents (sanctuary: 5.71%; zoo: 1.14%) reported that CF "always" impacted their job or made them feel apathetic. The majority of respondents from both settings reported that the COVID-19 pandemic contributed to their experiences of CF (sanctuary: 51.72%; zoo: 68.83%), while fewer respondents reported no effect (sanctuary: 27.59%; zoo: 19.48%), or that they were unsure (sanctuary: 20.69%; zoo: 11.69%). Caregivers from sanctuaries and zoos also did not significantly differ in the rates at which employees reported that the COVID-19 pandemic contributed to their experiences of CF (χ^2 : $p > 0.05$).

Table 2. CF and professional experience.

Variable	Sanctuary <i>n</i> (%)	Zoo <i>n</i> (%)
Have you ever experienced CF?		
Yes	31 (88.57)	81 (92.05)
No	1 (2.86)	3 (3.41)
Unsure	3 (8.57)	4 (4.55)
Chimpanzee experience		
0–5 years	25 (71.43)	52 (59.09)
6–10 years	3 (8.57)	23 (26.14)
11–15 years	4 (11.43)	5 (5.68)
16–20 years	3 (8.57)	5 (5.68)
>20 years	0 (0)	3 (3.41)
Current position		
0–5 years	31 (88.57)	56 (63.64)
6–10 years	2 (5.71)	21 (23.86)
11–15 years	2 (5.71)	4 (4.55)
16–20 years	0 (0)	3 (3.41)
>20 years	0 (0)	4 (4.55)
Which procedures to you regularly perform?		
Training	28 (80)	83 (94.32)
Feeding	31 (88.57)	87 (98.86)
Shifting	30 (85.71)	85 (96.59)
Cleaning	33 (94.29)	88 (100)
Preparing enrichment	23 (65.71)	87 (98.86)
Research	4 (11.43)	34 (38.64)
Routine vet procedures	6 (17.14)	52 (59.09)

Feelings commonly associated with CF, and experienced by more than 50% of all sanctuary respondents (*sensu* [11]), were exhaustion (91.43%), frustration (85.71%), anxiety (80%), depression (80%), apathy (77.14%), sadness (71.43%), anger (62.86%), resentment (60%), guilt (56.14%), and hopelessness (51.43%). For zoo employees, the feelings most commonly associated with CF were exhaustion (97.73%), frustration (88.64%), apathy (80.68%), anxiety (78.41%), depression (72.73%), sadness (65.91%), and hopelessness (55.68%). The least commonly reported feeling experienced by both sanctuary and zoo respondents was isolation (sanctuary: 40%; zoo: 42.05%). Again, there were no significant differences between the proportion of sanctuary and zoo employees who associated each of these feelings with CF (FETs: p s > 0.05).

The majority of respondents reported feeling that they had received adequate training and resources to do their job properly (sanctuary: 60%, zoo: 72.73%), though some were unsure (sanctuary: 5.71%, zoo: 9.09%) or felt they had not received sufficient training (sanctuary: 34.29%, zoo: 18.18%), with no effect of institution (FET: p > 0.05). Table 3 shows the frequency with which respondents felt they experienced a variety of sentiments that may be associated with CF. There was a significant association between institution type and frequency of feeling understaffed at work (FET: p < 0.001), with sanctuary employees feeling understaffed more frequently than zoo employees; however, the majority of employees at both institutions reported “always” or “often” feeling understaffed (sanctuary: 91.43%; zoo: 60.23%) and no respondents reported “never” feeling understaffed. There was also a significant association between institution type and the frequency with which respondents felt comfortable discussing concerns they had regarding their work or the animals in their care with their supervisors (FET: p = 0.041). Specifically, zoo employees reported comfort doing so slightly more frequently than sanctuary employees, although approximately half of all respondents “often” or “always” felt comfortable discussing these concerns (sanctuary: 48.57%; zoo: 51.14%).

Table 3. Summary of percent of responses for compassion fatigue feelings in the workplace.

How Often Do You Feel:	Institution	Always	Often	Sometimes	Rarely	Never	n
That you are understaffed at work	Sanctuary **	54.29	37.14	2.86	5.71	0	35
	Zoo **	22.73	37.50	35.23	4.55	0	88
Compassion fatigue negatively affects your ability to do your job	Sanctuary	5.71	22.86	48.57	20.00	2.86	35
	Zoo	1.14	19.32	47.73	22.73	9.09	88
Compassion fatigue has led you to feel apathetic towards your job	Sanctuary	5.71	31.43	40.00	20.00	2.86	35
	Zoo	1.14	31.82	46.59	14.77	5.68	88
Stressed at work	Sanctuary	25.71	60.00	11.43	2.86	0.00	35
	Zoo	12.64	49.43	26.44	10.34	1.15	87
Comfortable discussing your feelings in your place of work	Sanctuary	0.00	8.57	40.00	37.14	14.29	35
	Zoo	9.09	19.32	36.36	26.14	9.09	88
Comfortable discussing concerns you have regarding your work or animals in your care with your supervisors	Sanctuary *	5.71	42.86	34.29	14.29	2.86	35
	Zoo *	23.86	27.27	19.32	21.59	7.95	88
There is good communication between you and your supervisors	Sanctuary	5.71	31.43	37.14	25.71	0.00	35
	Zoo	9.09	36.36	28.41	21.59	4.55	88
Your workplace encourages employees to balance their professional lives and personal lives	Sanctuary	8.57	22.86	28.57	22.86	17.14	35
	Zoo	6.90	16.09	29.89	33.33	13.79	87
You blame yourself for the suffering of an animal or group of animals in your care	Sanctuary	5.71	22.86	37.14	31.43	2.86	35
	Zoo	2.30	18.39	41.38	25.29	12.64	87
You alone are responsible for the well-being of an animal or groups of animals in your care	Sanctuary	11.43	17.14	25.71	28.57	17.14	35
	Zoo	14.77	18.18	21.59	32.95	12.50	88

Note. FET: * $p < 0.05$; ** $p < 0.001$.

3.2. Factors Influencing Compassion Fatigue

The top work-related factors reported as influencing feelings of CF to an “extreme” or “moderate” degree, as rated by $\geq 60\%$ of sanctuary employees (*sensu* [11]), were being understaffed (97.14%), lack of resources (77.14%), lack of training (62.86%), poor relationships with coworkers (60%), and poor relationships with supervisors (60%; see Figure 1A). For zoo employees, the top work-related factors were being understaffed (84.09%), poor relationships with coworkers (72.73%), lack of resources (71.59%), and poor relationships with supervisors (70.45%; see Figure 1B). The top personal-related factors reported as influencing feelings of CF to an “extreme” or “moderate” degree among sanctuary employees were financial problems (77.14%), poor mental health (74.29%), and owned pets have poor health (60%; see Figure 2A). For zoo employees, these were poor mental health (84.09%), financial problems (67.82%), and poor physical health (62.5%) (see Figure 2B).

Considering personality, the trait with the highest average score for caregivers from each institution was conscientiousness (sanctuary: $M = 6.16$, $SD = 0.92$; zoo: $M = 6.43$, $SD = 0.71$), which was followed by openness to experiences (sanctuary: $M = 5.6$, $SD = 1.05$; zoo: $M = 5.55$, $SD = 1.07$), agreeableness (sanctuary: $M = 5.3$, $SD = 1.15$; zoo: $M = 5.2$, $SD = 1.24$), emotional stability (sanctuary: $M = 4.17$, $SD = 1.42$; zoo: $M = 4.69$, $SD = 1.39$), and then extraversion (sanctuary: $M = 4.1$, $SD = 1.5$; zoo: $M = 4.03$, $SD = 1.7$). There were no significant differences across average personality trait scores between sanctuary and zoo employees as well as between our respondents and the previously reported norms for the TIPI [55]. Given ceiling effects for having experienced CF, we were unable to analyze which personality traits were associated with experiencing CF.

Respondents were also asked whether they had experienced seven stressful chimpanzee-specific events during their careers which have the potential to influence feelings of CF (Table S1). As only four (3.25%) total respondents reported not having experienced CF, we were again unable to complete further analyses. We do note, however, that a significantly greater percentage of sanctuary employees than zoo employees ($\chi^2 (2, 122) = 15.83$, $p < 0.001$) experienced euthanasia at least once while working as chimpanzee caregivers.

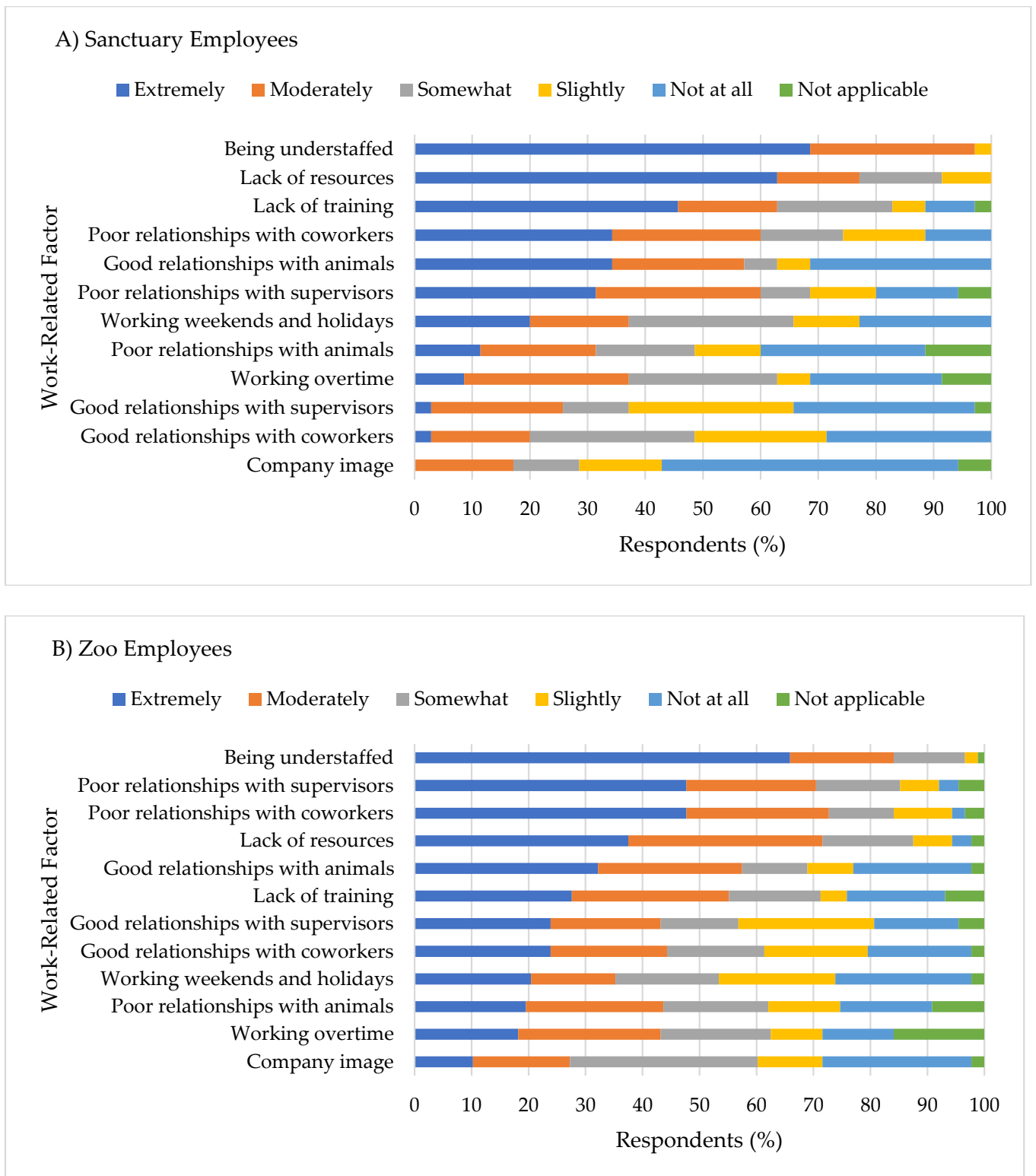


Figure 1. Percentage rankings of work-related factors influencing feelings of compassion fatigue for (A) all sanctuary employees ($n = 35$) and (B) all zoo employees ($n = 88$, except $n = 87$ for lack of training and good/poor relationships with animals).

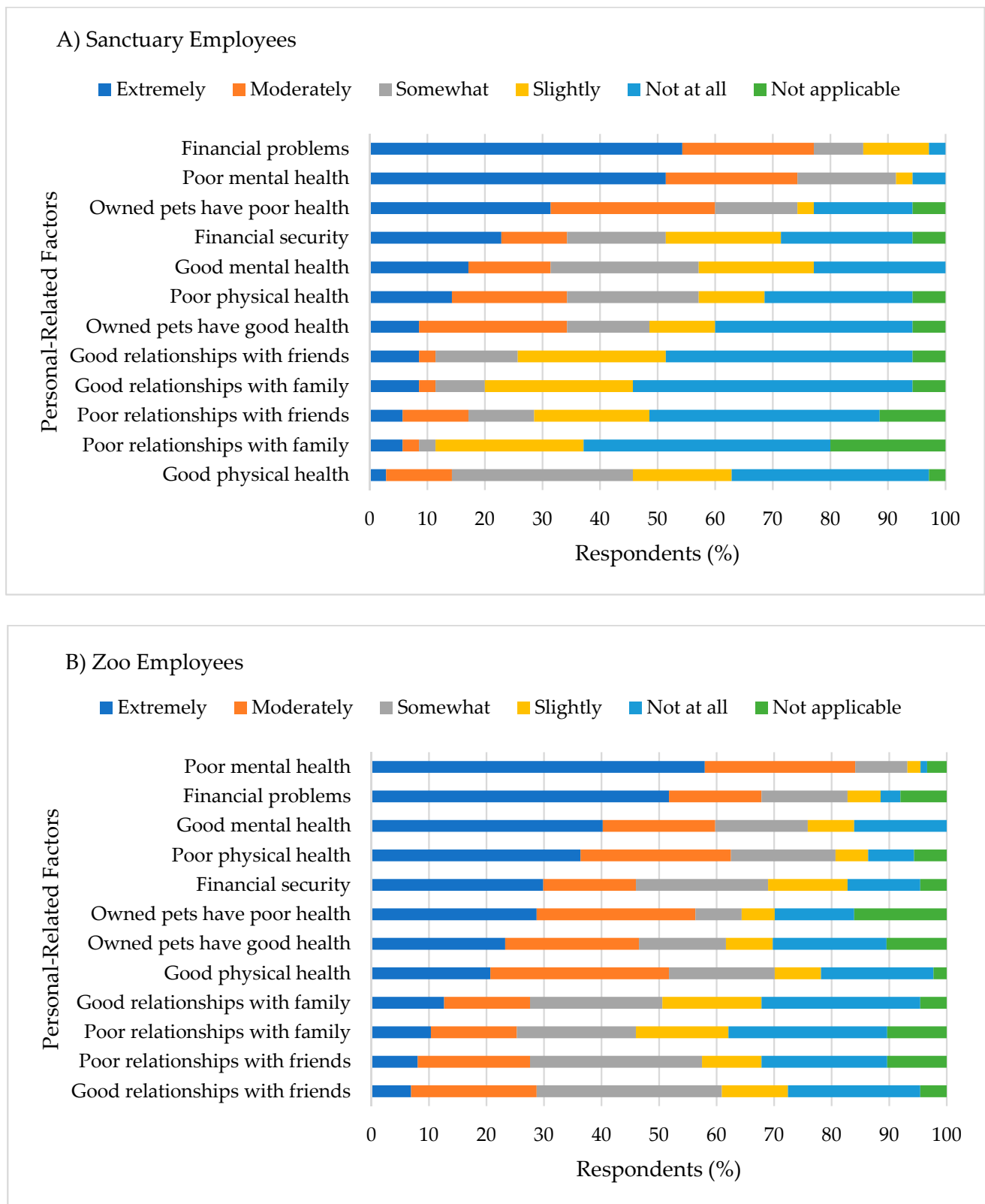


Figure 2. Percentage rankings of personal-related factors influencing feelings of compassion fatigue for (A) all sanctuary employees ($n = 35$) and (B) all zoo employees ($n = 88$ for poor mental and poor physical health, $n = 86$ for owned pets have good health, $n = 87$ for all others).

3.3. Coping Mechanisms and Support Programs

Sanctuary and zoo employees generally used coping mechanisms at comparable rates, with “talking to someone” being the most common coping mechanism for both groups (sanctuary: 94.29%; zoo: 90.91%; Figure 3). The other coping mechanisms cited by $\geq 60\%$ of all respondents (*sensu* [11]) were owning and caring for pets (sanctuary: 74.29%; zoo: 65.91%), self-care strategies (sanctuary: 68.57%; zoo: 63.64%), and getting away from work (sanctuary: 60%; zoo: 81.82%), while emotional eating was also a common strategy for sanctuary employees (71.43%).

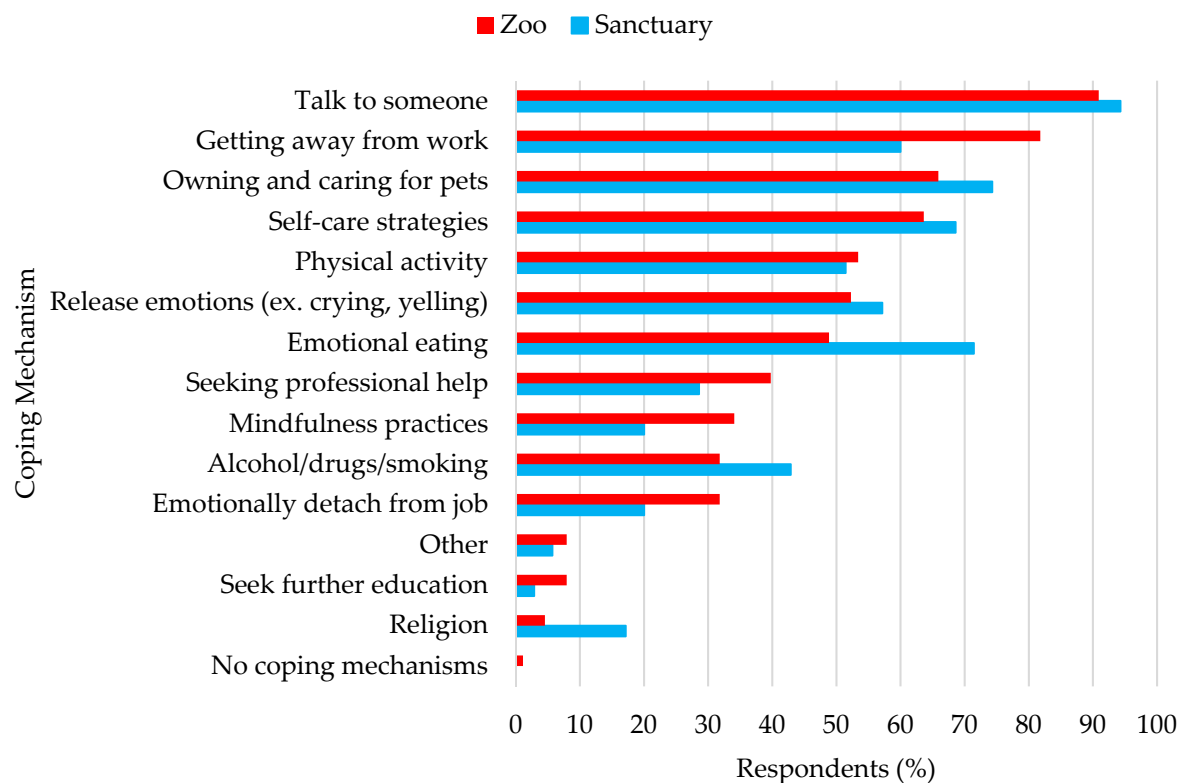


Figure 3. Percentage rankings of coping mechanisms for compassion fatigue for zoo ($n = 88$) and sanctuary ($n = 35$) respondents. Participants were asked to select all options that apply.

We ran a series of logistic regression analyses to determine whether personality trait scores and institution type predicted caregivers’ use of 15 different CF coping mechanisms. Our full model outperformed our null model for the coping mechanism mindfulness ($\chi^2(6) = 18.40$, $p = 0.005$, McFadden’s $R^2 = 0.12$), with extraversion scores the only significant predictor ($\beta = 0.37$, $SE = 0.15$, $p = 0.01$, 95% CI [0.1, 0.67]). Specifically, a one unit increase in extraversion scores increased the odds of using mindfulness by a factor of 1.45. The model was also significant for the coping mechanism emotional eating ($\chi^2(6) = 15.98$, $p = 0.014$, McFadden’s $R^2 = 0.09$), with both agreeableness ($\beta = -0.37$, $SE = 0.18$, $p = 0.037$, 95% CI [−0.73, −0.03]) and organization type ($\beta = -0.91$, $SE = 0.46$, $p = 0.047$, 95% CI [−1.85, −0.03]) significant predictors. A one-unit increase in agreeableness scores decreased the odds of emotional eating by a factor of 0.69, while working at a sanctuary rather than a zoo increased the odds of emotional eating by a factor of 0.4. The full model did not outperform the null model for all remaining coping mechanisms (talking to someone, self-care strategies, seeking professional help, getting away from work, physical activity, religion, recreational use of alcohol/drugs/cigarettes, releasing emotions after work, owning and caring for pets, emotionally detaching from work, seeking further education, “other” coping mechanisms, or not currently using any coping mechanisms).

The majority of respondents reported that their coping strategies were “sometimes” effective at alleviating their feelings of CF (sanctuary: 60%; zoo: 64.77%). Fewer respondents

reported that their coping strategies were “often” (sanctuary: 14.29%; zoo: 21.59%) or “rarely” (sanctuary: 20%; zoo: 7.95%) effective, and almost no respondents reported that their strategies were “always” (sanctuary: 2.86%; zoo: 4.55%) or “never” (sanctuary: 2.86%; zoo: 1.14%) effective.

When asked about CF-related institutional support programs, most respondents reported that their institutions did not have a support program or that they were unsure (sanctuary: 74.29%; zoo: 81.82%). Of the respondents who reported having a CF support program, sanctuary respondents reported that these programs were “rarely” (44.44%) or “never” (55.56%) helpful, while zoo employees reported they were “sometimes” (50%), “rarely” (12.5%), or “never” (37.5%) helpful. No respondents at either type of institution reported that their institution’s CF support program was “always” or “often” helpful. There was a significant association between institution type and whether respondents had received self-care or resiliency training through their place of employment (FET: $p = 0.002$), with a greater percentage of sanctuary employees (41.18%) than zoo employees (11.36%) reporting that they had received such training. The remaining respondents from both types of institution reported having never received any form of self-care or resiliency training through their place of employment (sanctuary: 52.94%; zoo: 80.68%) or were unsure (sanctuary: 5.88%; zoo: 7.95%).

Respondents were also asked to rank several lists of programs to have in their place of work that may help with CF. The most commonly top-ranked physical program was monetary reimbursement for activities outside of work (sanctuary: 38.24%; zoo: 52.87%), followed by none of the listed options (sanctuary: 32.35%; zoo: 18.39%), a place and time to exercise at work (sanctuary: 14.71%; zoo: 14.94%), and activity groups at work (sanctuary: 14.71%; zoo: 13.79%). The most frequently top-ranked mental/emotional program was having a therapist on site (sanctuary: 52.94%; zoo: 28.41%), followed by having a quiet place (sanctuary: 32.35%; zoo: 25%), self-care training (sanctuary: 2.94%; zoo: 17.05%), mindfulness classes (sanctuary: 2.94%; zoo: 11.36%), classes or training on coping mechanisms (sanctuary: 2.94%; zoo: 7.95%), none of the listed options (sanctuary: 0%; zoo: 6.82%), and self-monitoring of CF (sanctuary: 5.88%; zoo: 3.41%). The most commonly top-ranked social program for both sanctuary and zoo employees was a support group (sanctuary: 26.47%; zoo: 24.71%), then recreational activities outside work (sanctuary: 17.65%; zoo: 23.53%), building and strengthening relationships with coworkers (sanctuary: 17.65%; zoo: 17.65%), a memorial for animals (sanctuary: 20.59%; zoo: 9.41%), lunch time activities (sanctuary: 11.76%; zoo: 11.76%), and finally none of the listed options (sanctuary: 5.88%; zoo: 12.94%). For both sets of employees, the most commonly top-ranked work management program was paid leave from work, potentially for mental health or emotional support days (sanctuary: 60.61%; zoo: 51.72%). This was followed by enforcing strict workday hours (sanctuary: 15.15%; zoo: 14.94%) and reward programs (sanctuary: 18.18%; zoo: 13.79%), communications workshops (sanctuary: 3.03%; zoo: 9.2%), childcare programs at work (sanctuary: 0%; zoo: 8.05%), and debriefing on experiments and veterinary procedures (sanctuary: 3.03%; zoo: 2.3%). No respondents rated the ability to change the workspace environment or none of the listed options as their top choice.

4. Discussion

We surveyed chimpanzee caregivers employed by GFAS-accredited sanctuaries and AZA-accredited zoos to assess the prevalence of compassion fatigue (CF). We also assessed the symptoms caregivers associated with CF, the work- and personal-related factors that influence CF, individual coping mechanisms, and the perceived helpfulness of pre-existing institutional support programs. 91.06% of respondents self-reported that they had experienced CF *at some point* in their career as a chimpanzee caregiver, with no effect of gender, age, or experience. The most commonly cited CF symptoms were exhaustion, frustration, anxiety, depression, and apathy, while perceived stressors included understaffing, lack of resources and training, poor workplace communication, and financial insecurity. Respondents reported varying levels of success coping with CF, most often relying on talking to

someone, getting away from work, self-care, and having pets. Most respondents did not have or were unsure of whether their institution provided a support program, and when present, these programs were rarely viewed as helpful. The prevalence of CF is noteworthy given its association with negative outcomes, not only for the individuals experiencing CF, but also for the animals they care for and the institutions employing them [7,11].

4.1. Institution Type

Contrary to our hypothesis, sanctuary employees were not more likely to have experienced CF than zoo employees. There were few significant differences in respondents' responses across institutions despite sanctuary employees experiencing both natural deaths and euthanasia, known risk factors for CF [29,32,51], more frequently than zoo employees. The lack of differences is notable considering sanctuary caregivers tended to be younger and have less experience than zoo caregivers, which may variably influence CF seen in human caregivers [58,59]. Furthermore, many sanctuaries house a larger population of chimpanzees than zoos, whereas caregivers at zoos may care for fewer chimpanzees and other species. It is possible that these factors influence CF, although further research is necessary.

Of the differences we did see, sanctuary employees reported feeling understaffed more frequently than their zoo counterparts, although reports of understaffing were common across both institutions. Sanctuary employees also felt comfortable discussing their concerns with their supervisors less often than zoo employees, however respondents from both institutions usually felt comfortable doing so, suggesting that job-related and animal welfare concerns were not neglected. Conversely, the majority of respondents from both institutions only sometimes felt comfortable discussing their feelings at work, indicative of greater comfort discussing the animals in their care and job concerns than their own feelings. Respondents from both settings were also similar in their reports of CF sometimes negatively impacting their ability to do, and feelings of apathy towards, their job, though reports that CF always had these effects were rare. Lastly, though a greater percentage of sanctuary (41.18%) employees than zoo (11.36%) employees received self-care and resiliency training, the majority of respondents had not, stressing the need for additional programs.

4.2. Prevalence and Symptoms of CF in Chimpanzee Caregivers

Given the wide range of approaches and measures used to assess CF in animal-related fields [32], it is often difficult to form appropriate comparisons with other assessments of CF across the broader animal care community. However, by adopting the questionnaire and CF definition developed by Randall et al. [11], we can draw some comparisons to this research group's recent CF surveys of lab animal professionals in North America [11], Europe, China, and Japan [13]. Notably, chimpanzee caregivers' self-reported rates of CF were higher (91.06%) than those documented in lab animal professionals across four geographical regions (North America (67.54%) [11], Europe (51.66%), China (52%), and Japan (35%) [13]).

One possible explanation for this is the role the COVID-19 pandemic played in CF. A comparable study used a slightly different definition of CF and found higher levels of self-reported CF at some point in their career among lab animal personnel surveyed during the pandemic (86%) [12] compared to those sampled prior to the pandemic (67.54%) [11]. Other studies similarly report a relationship between the pandemic and heightened CF in professions including healthcare workers [60,61] and teachers [62]. Finding that the majority of chimpanzee caregivers reported that the pandemic contributed to their feelings of CF demonstrates that it had a similar compounding effect in this population. Whether this increase was due to the general stress caused by the pandemic or institutional stressors driven by the pandemic, such as understaffing and a lack of resources, will require further investigation. However, that almost a third of respondents indicated the pandemic did not contribute to CF shows susceptibility prior to the pandemic's onset. It is also unclear why rates of CF were substantially lower in international lab animal personnel who, unlike

North American lab animal personnel, completed the survey during the pandemic. Such variation may reflect cultural differences [63,64], different labor laws and regulations regarding animal care across countries [65], or countries' contrasting responses to the pandemic [66], among other factors, and warrants further research.

Despite variation in the prevalence of CF between North American [11,12] and international [13] lab animal personnel, feelings associated with CF were similar to those felt by chimpanzee caregivers. Both populations' experiences of CF were most commonly characterized by exhaustion, with chimpanzee caregivers also reporting frustration, apathy, anxiety, depression, and sadness slightly more frequently than lab animal personnel [11,13]. Whereas just over half of all chimpanzee caregivers also reported feelings of hopelessness, resentment, and anger, these feelings were less common among lab animal personnel [11,13]. Isolation was the least common feeling experienced by chimpanzee caregivers, suggesting that the caregivers, like other lab animal professionals ([11,13] but see [12]) were able to rely on strong interpersonal relationships with friends, family, and coworkers.

While our results do not provide the reason why rates of CF were higher among chimpanzee caregivers than other animal caregivers [11–13,67], they do align with the high levels of CF previously found in this population when assessed with the ProQOL-V [17]. We suspect several factors contributed to this finding. First, as discussed, COVID-19 may have added workplace and personal stress, inflating levels of CF (see also [12]). Second, previous surveys of lab animal personnel included a wide range of professions (caregivers, research staff, study directors, veterinarians and veterinary support staff) [11–13], which can influence rates of CF as workplace stressors vary across roles [35]. Third, the species cared for was likely a contributing factor [43]. Although humans may form strong bonds with diverse species, the long life spans of chimpanzees and their phylogenetic similarities with humans can strengthen empathetic and compassionate bonds [38,44,48], plausibly increasing CF susceptibility [8]. Finally, as in some lab animal personnel [12], self-reported experiences of CF may be greater than respondents' scores on other measures of CF, such as the ProQOL-V [52].

4.3. Coping Mechanisms and Support Programs

In addition to identifying CF symptoms and risk factors, one of our main objectives was to assess caregivers' preferred coping mechanisms and the support programs institutions have in place. For individual coping mechanisms, talking to someone was most commonly cited, followed by self-care, having and caring for pets, and taking breaks from the workplace (see [12,15,32,68] for similar findings in animal care professions). Nearly two-thirds of respondents reported these mechanisms were sometimes effective, implying that the majority of caregiver's coping strategies periodically helped alleviate feelings of CF. At the institutional level, while some institutions previously implemented self-care or resiliency trainings, more widespread training, particularly at zoos, may provide additional benefits to employees, as has been the case with human caregivers [69] and lab animal professionals [14]. Support programs specifically for CF were even rarer, and of the 25 respondents who reported having an institutional CF support program, zoo employees most commonly perceived them to be sometimes helpful while sanctuary employees viewed these programs as offering little to no help. This suggests space to modify and update these programs and trainings to further assist caregivers. Mindfulness training, for example, is known to benefit other caregiving professionals [70–72], but has yet to be systematically studied in animal caregivers. Additional trainings and practices known to be effective for human caregivers experiencing CF (e.g., talking through issues, self-care, resiliency training, and getting away from work) may also benefit animal caregivers [28,33].

Respondents were also asked to rank several physical, work management, mental/emotional, and social programs that would be beneficial to have in their workplace to help with CF. Chimpanzee caregivers ranked monetary reimbursement for activities outside of work, such as a gym membership, highest among physical factors, closely followed by noting that none of the listed physical factors would be beneficial (see also [11,13]). In

line with other studies that highlight paid leave as a preferred program [11,13], for work management programs, approximately half of all respondents ranked paid leave from work (e.g., for mental health or emotional support days) as their top work choice. These findings stress compensation for personal days and activities as key considerations for chimpanzee caregivers and caring professionals more generally, though future research is necessary to directly assess their, and other physical and work-related programs, benefit to caregivers.

Among mental/emotional factors, a therapist on site and a quiet place to be alone and reflect ranked highly, which fit with the two most frequently cited individual coping mechanisms (talking to someone and getting away from work). Lab animal personnel also ranked having a quiet place at work as the most beneficial mental/emotional program [11,13], suggesting that quiet spaces are a valuable means of support for animal caregivers. The top ranked social program was a support group, though recreational activities outside of work and building and strengthening relationships with coworkers also featured prominently (see also [9,11]). Social support is known to provide broad mental health benefits [73]; accordingly, although most respondents reported that relationships with friends and family were less strongly linked to feelings of CF than finances and mental health, strong interpersonal relationships both in and out of work may nonetheless help mitigate CF in the workplace [8,74]. While these factors were ranked highly by respondents, this does not guarantee their effectiveness at mitigating CF. The variation in how respondents prioritized these programs suggests that there is no universal solution; instead, programs may need to be individualized to institutions and employees [10,28].

4.4. Future Directions and Limitations

CF has received increased attention over the past several years. Some zoos [75] and chimpanzee sanctuaries [53] are following the path of research animal laboratories [10,14,15] by providing or updating CF support programs, resources, and trainings, showing greater awareness of CF and providing employees with tools to help mitigate and treat CF. However, although some programs have been successfully implemented and systematically evaluated for human (e.g., [69,76,77]) and animal caregivers (e.g., [10,15,25,28,68,78]), similar evaluations of the efficacy of interventions are needed in sanctuary and zoo settings. Future research should also seek to evaluate CF at the institutional level as institution-specific stressors have previously been found to influence CF [79,80].

While the findings reported here may provide zoos and sanctuaries with more information regarding the professional wellbeing of chimpanzee caregivers, further CF research is needed in these populations. In particular, additional research is needed to evaluate CF in caregivers working with other species using a variety of measures, from structured interviews (e.g., [26]) to assessments such as the ProQOL-V [52]. This should help determine whether the high rates of CF reported here are specific to caring for chimpanzees and our measurements, or whether they apply to sanctuary and zoo animal caregivers more broadly. Given the ceiling effects we observed, research involving more nuanced questions about the intensity and frequency of feelings of CF is necessary for a complete picture of the risk and protective factors associated with it. Future research will also help tease apart the influence of setting (sanctuary or zoo vs. lab), species (chimpanzees vs. lab animals), cultural differences (Western vs. Eastern cultures), and any role of the Covid-19 pandemic.

Although we report a high prevalence of CF in this population, it does not preclude the presence of CS in chimpanzee caregivers [17]. It is also important to note that we asked whether respondents had ever experienced CF in their careers as chimpanzee caregivers. Our results should therefore be interpreted with care as we provide data on the broader experience of being a chimpanzee caregiver at a sanctuary or zoo rather than assessing whether caregivers are currently experiencing CF or the intensity of their symptoms. Moreover, we cannot rule out the possibility that some respondents cared for chimpanzees at both types of institutions, complicating comparisons, while we also note fewer sanctuaries than zoos participated in this study. Finally, the prompt at the beginning of this survey notes that CF is a “normal occurrence and is commonly seen” which may have unintention-

ally led respondents to respond that they had experienced CF resulting in ceiling effects, although we think this is unlikely as ceiling effects were not found for lab animal personnel presented with the identical prompt in the same place in the survey [11,13].

5. Conclusions

The majority of chimpanzee caregivers employed by accredited sanctuaries and zoos in the United States experienced CF at some point in their careers caring for chimpanzees. These data are vital in continuing to advance our understanding of the interaction between animal care and human mental health [8,31]. Interpersonal relationships both in and out of work, lack of resources, financial security, and especially understaffing were highlighted as significant factors influencing CF. Alongside a recent ProQOL-V study of chimpanzee caregivers [17], our results provide the first step in addressing CF in chimpanzee caregivers by identifying potential areas to help guide future interventions. We encourage future research to build on these findings to design and evaluate CF interventions in chimpanzee care and animal-related professions. Continuing to create a “culture of care” that considers the wellbeing of employees alongside animal wellbeing has the potential to help alleviate stressors associated with CF, which, in turn, may improve both employees’ professional and personal lives and animal wellbeing [31,35,75,81,82].

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/jzbg5010001/s1>, Table S1 and a copy of the survey provided as supplementary materials.

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